QuickStart

User Manual

BR2303NI-A01-DC080

Plug-n-Play Servo System
with analog drive, brushed motor and cables
(Continuous 3.1 lb-in, 4700 rpm)

ADVANCED MOTION CONTROLS

v. 1.02

Thank you for purchasing this QuickStart package!
QuickStart makes it easy to set up Advanced Motion Controls drives to get your system running quickly. The drive and motor have been matched with each other, the cables are custom made for this system and an interface board simplifies integration with your controller.

Remember, if you need us, we are here for you!
Our goal is to get you up and running as quickly as possible. If at any point you have a question, a team of applications engineers and our customer service staff are just a phone call away. We are available weekdays from 8am to 5pm Pacific Time at **805-389-1935**. We can also be contacted via email through our website www.a-m-c.com - go to "Contact Us".

4 steps to success!

1	2	3	4
Getting Started What's included with QuickStart and what to expect.	**5-Minute QuickStart** Lets spin the motor!	**Integrate QuickStart into your System** Get your machine working.	**Going into Production** Transitioning from prototype to production.

This manual has been laid out in four sections to guide you through the process of setting up and integrating your QuickStart system. By following each step in succession you will first be introduced to QuickStart, then hook up the system for a simple bench test, and then integrate QuickStart into your machine and finally transition into the production stage.

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1
Getting Started

BR2303NI-A01-DC080

What to Expect

What is 'QuickStart'?
QuickStart is a system offering including: a drive, a motor, all necessary cables, and an interface board with screw terminal connections - all in one box ready for fast delivery!

What purpose does 'QuickStart' serve?
QuickStart is intended to introduce OEMs to Advanced Motion Controls servo drives and provide a positive first experience.

Why is Advanced Motion Controls offering a 'QuickStart' package?
We realize that many OEMs today are faced with trying to get their machinery to market using the fastest possible methods. Our solution is to provide a means by which motion control can be quickly proven.

How does 'QuickStart' benefit potential customers?
QuickStart is designed to make system prototyping easier to include Advanced Motion Controls' servo drives. The attraction to OEM's is a savings of time, money and the personnel needed to move from conception to production. Upon receipt, everything will plug in and operate within 5 minutes. All systems are initially configured in velocity or voltage mode to turn the motor shaft at 30 +/- 20 rpm. This is an indication that when put together, it works out of the box. No pots to tweak or software to configure!

Are the motors in the 'QuickStart' program available for individual resale?
Quite simply, not from Advanced Motion Controls. The motors in these packages are meant to represent what is commonly available from many different manufacturers. Your local Advanced Motion Controls representative can handle requests for motor model information for additional purchases.

How is 'QuickStart' pricing important to me?
Careful selection of systems incorporate popular Advanced Motion Control's drives in order to maximize exposure and minimize costs.

What other considerations should you know about 'QuickStart'?
Although it will be hard to find easy-to-configure systems like these at lower prices anywhere, QuickStart isn't intended for multiple, pre-packaged system selling. Initial exposure to Advanced Motion Controls' drives is the key. Each project will be followed up by our Sales department to determine overall progress and assist in determining the next step.

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1
Getting Started

Package Contents

☐ Brushed Servo Drive	12A8
☐ Brushed NEMA 34 Motor	MBR2303NI
☐ Screw Terminal Board	SIB (System Interface Board)
☐ Motor Power Cable (10 foot)	CBL-P01-10
☐ Drive Cable (1.5 foot)	CBL-D01
☐ Documentation	Quick Connect Sheet
	User Manual
	Brochure with CD ROM

Additional Requirements

Item	Notes
Power Supply	**Requirements:** • **Output voltage between 20-80VDC** • **Current output of 6A continuous** • **Isolation transformer between the AC input and DC output.** Selected AMC Power supplies. 1st choice: PS16L60, PS16L72, PS16L80 2nd choice: PS300W48, PS300W72, PS16L40 Note: Power Supplies with voltages lower than 60VDC will be speed limited. Speed = [(Supply Voltage – 7.4) / 11] * 1000
Feedback	Since this package does not come with feedback, an additional encoder or tachometer must be installed for precise position or velocity control.
Controller	+/-10V command signal.

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2
5-Minute QuickStart

Let's spin the motor!

This quick setup procedure will get the motor moving in a short amount of time *without the need for a controller*. The drive has been pre-configured in **voltage mode** with a slight offset. This will turn the motor at a slow steady speed on power-up to demonstrate operation. Once the system is shown to be operational, the next section **Integrating QuickStart into your System** will guide you through the process of integrating the system into your application.

Wiring

On page 7, you will find the cables and connections sheet. Use this as a reference when following the steps in this section.

Drive

Connect cable CBL-D01 to the P1 connector on the drive. Connect the other end to the C2 connector on the system interface board (SIB).

Motor

Connect the white connector on the motor to the corresponding connector on cable CBL-P01-10. Connect the red and black wires to the P2 connector on the drive.

Black	Motor -, P2-1
Red	Motor +, P2-2

System Power

With the power supply turned OFF, connect the main power supply to the drive. REVERSING THE POLARITY WILL DESTROY THE DRIVE. High Voltage goes to P2-5 and ground goes to P2-4.

Grounding

Bring all ground wires to a central point ground such as a ground bus, ground plane or a single ground bolt. Also don't forget to ground the drive chassis! Use the silver screw marked PE on the case.

Motor Ground – The green wire coming from motor power cable is the motor chassis ground. If the motor is already grounded through direct contact with the machine housing, then leave the green wire disconnected. Grounding the motor at both the green wire and at the motor case causes a ground loop that has been shown to disrupt the feedback signals. Choose one or the other.

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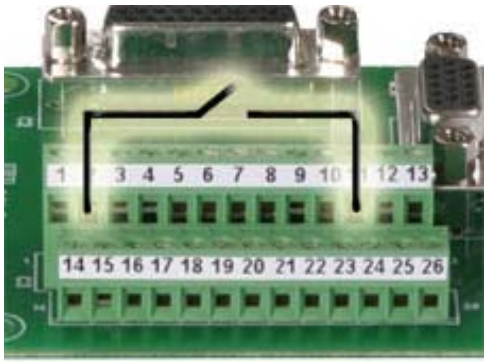
Inhibit Switch (optional for this section)

An inhibit switch (not included) can be connected between pins 9 and 11 on the Interface Board. This switch disables power to the motor until you are ready. Opening the switch Enables the drive, closing the switch Disables the drive.



Cautions

Unexpected motion – To avoid the motor from jumping unexpectedly and causing damage, the motor should be secured either with clamps or bolted down using its mounting holes.

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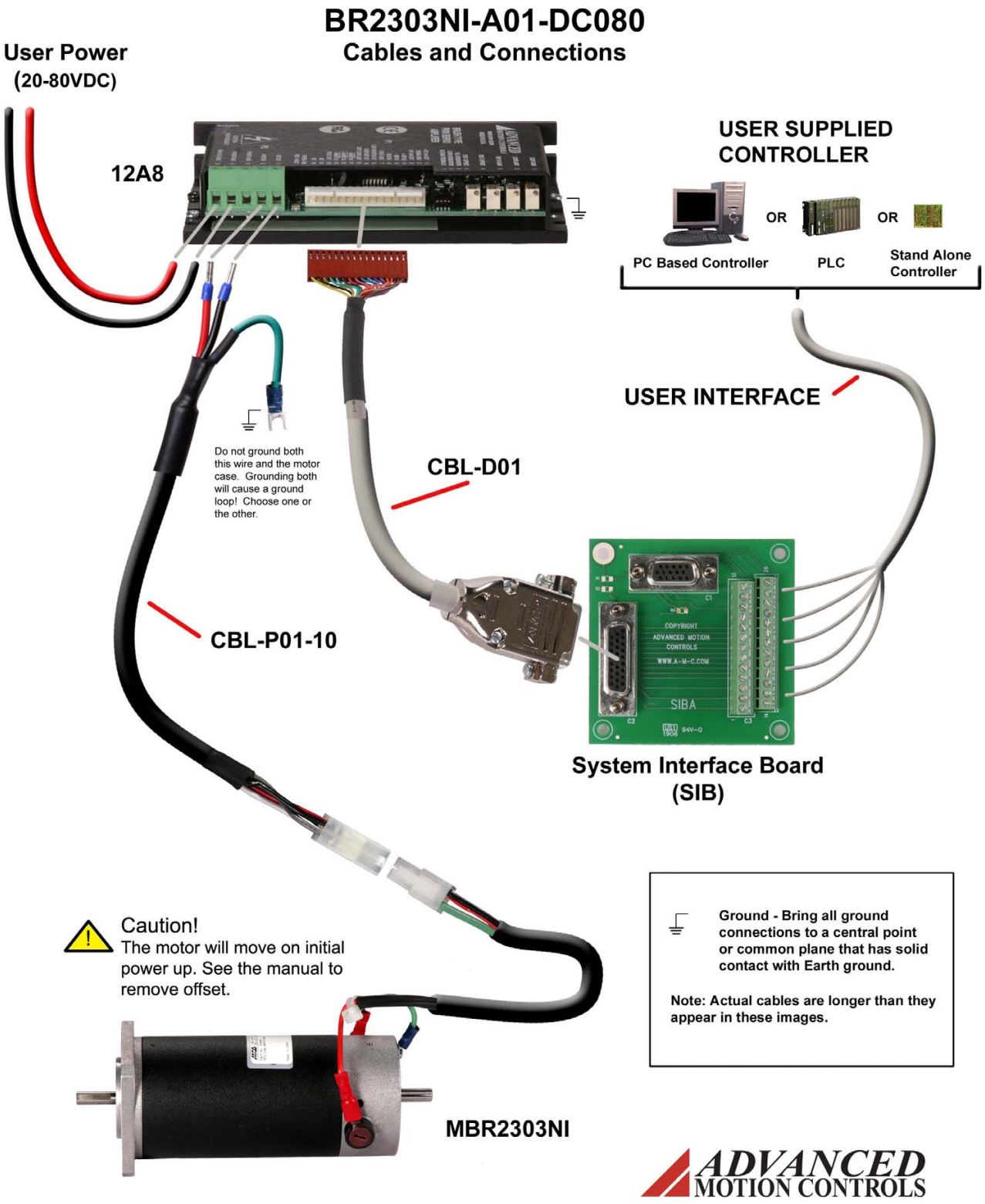

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Inhibit Line Test (optional) *– Follow this step only if you installed the inhibit switch described in the wiring section on page 6. This is to verify that the optional inhibit switch is functioning and the drive is initially powered up in a disabled state.*

1. Disconnect the motor power by unplugging the white connector on CBL-P01-10. *Unplugging this connection allows you to power up the system without the possibility of spinning the motor.*
2. Apply power to the drive. Toggle the inhibit switch and verify that you can cause the LED color to change from Red to Green. Set the switch so the LED is Red.
3. Remove power from the drive and reconnect the white connector on CBL-P01-10.

System Power Up

1. Apply power to the drive. *If an inhibit switch has been installed, enable the drive by toggling the inhibit switch so the LED turns Green.*
2. The motor should turn at a smooth controlled speed.
3. If the motor turns then the system has been hooked up correctly. Remove power and continue to the next section. If not then go to **Troubleshooting**.
4. To stop the motor from turning, turn the Test/Offset switch (SW4) to the OFF position. Then use the offset pot (Pot 4) to set the speed to zero.

Troubleshooting

LED not lit.	Verify that power has been applied to the drive.
Motor doesn't have holding torque	Verify that the LED is Green.
LED doesn't turn Green.	Verify all cables are connected. If an Inhibit Switch has been installed, toggle the Inhibit switch.
Motor doesn't turn but has holding torque	Turn Pot 4 (Test/Offset) in either direction. This will change the amount of offset in the drive.
Contact Factory - If you can't get the motor turning within a few minutes, please call and ask for technical support! 805-389-1935. We want to get you up and running quickly!	

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The following instructions are a continuation of the **5-Minute QuickStart**. This section explains controller wiring, drive configuration, drive mounting, motor mounting, SIB mounting and load coupling.

Signal Ground

Almost all signals between the drive and the controller are referenced to signal ground. Without this reference, the drive and the controller would not be able to transmit signals to each other. To ensure that the signals between the drive and the controller are referenced to the same potential, the signal grounds on the controller and the drive must be connected together. This is especially important for:

- Single ended command signals
- Inhibit line
- Other inputs and outputs.

You will need to identify the signal ground on your controller and connect it to the signal ground on the drive. For your convenience, the Signal Ground is accessible at two locations on the SIB. However, to avoid ground loops there should only be one connection between the drive signal ground and the controller signal ground. Don't add a connection if there is already continuity between the two grounds.

Available Signal Ground Locations on the SIB

Controller	SIB
Signal Ground	C3-2 (SGND)
	C3-7 (Tach/GND)

Command Signal

Command signal and mode selection are dictated by the capabilities of your controller and the desired operation of your system. Analog +/- 10V command signals are suited for torque and velocity modes

+/-10V Command Signal (Single Ended)

Signal	SIB	Available Drive Modes
Command	C3-4 (Ref+)	Torque Mode, Velocity Mode

+/-10V Command Signal (Differential)

Signal	SIB	Available Drive Modes
Command +	C3-4 (Ref+)	Torque Mode, Velocity Mode
Command -	C3-5 (Ref-)	

More Information on Mode Selection

Drive modes can be separated into three basic categories: Torque, Velocity and Position. The name of the mode describes what servo loops are being closed in the drive. They don't describe the end-result of the operation. For example, a drive in Torque mode can still be

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in a positioning application if the external controller closes the position loop. In fact, most high performance positioning systems use a drive in torque mode with the controller closing the velocity and position loops.

The correct mode is determined by the requirements of the controller. Some controllers require that the drive be in torque mode. Other controllers require that the drive be in velocity mode. Check the documentation on your controller or contact the manufacturer of your controller to determine the correct mode for your drive.

Once the command signal and mode have been selected, connect the controller to the signals as indicated in the above tables. The proper gains and command settings must also be configured. This will be explained later in the configuration section.

Drive Inhibit (recommended)

The inhibit line is used to turn off power to the motor while the drive is still powered on. Sometimes this is necessary if power to the motor needs to be removed quickly or if the user needs to manually move the load in a freewheeling condition. If your controller has an inhibit function then we highly recommend that you use it.

Inhibit Connection

Controller	SIB
Inhibit	C3-11 Inhibit

Note: The inhibit input is configured to disable the drive when pulled low (active low).

Drive Mounting

Mounting Dimensions can be found in the drive datasheet in the Appendix.

The drive can be mounted flat against the base plate or along the spine.

Mounting the drive flat on the base plate against a large thermally conductive surface for cooling will provide the most natural heat dissipation for the drive. A metal back plane in a cabinet on the machine often makes a good surface.

Drives mounted on the spine can be mounted next to each other. Maintain a minimum separation of 1 inch between drives to provide adequate convection cooling.

Note: Additional cooling may be necessary to dissipate the heat generated by the drive depending on ambient temperatures, duty cycle and natural ventilation.

Motor Mounting

Mounting Dimensions can be found in the motor datasheet in the Appendix.

The mounting surface must be stiff enough so it does not deflect when radial loads are applied to the motor shaft. The mounting surface should also have good thermal conductivity, especially if peak performance is demanded of the motor.

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SIB Mounting

Mounting Dimensions can be found in the SIB datasheet in the Appendix.

The SIB can be mounted using the mounting holes or a DIN tray such as from Phoenix Contact. If using the mounting holes, standoffs must be used to keep the bottom of the SIB from shorting with the mounting surface.

Cable Routing

Cable Datasheets can be found in the Appendix.

QuickStart cables come with excellent shielding and make proper grounding easy. This makes proper cable routing less critical, however proper routing practices should still be followed.

Route cables to minimize length and minimize exposure to noise sources. The motor power wires are a major source of noise and the motor feedback wires are susceptible to receiving noise. This is why it is never a good practice to route the motor power wires close to the motor feedback wires even if they are shielded. Although both of these cables originate at the amplifier and terminate at the motor, try to find separate paths that maintain distance between the two. A rule of thumb for the minimum distance between these wires is 1cm for every 1m of cable length.

Grounding

Bring all ground wires to a central point ground such as a ground bus, ground plane or a single ground bolt. Also don't forget to ground the drive chassis! Use the silver screw marked PE on the case.

Motor Ground – The green wire coming from motor power cable grounds the motor chassis. If the motor case is already grounded through direct contact with the machine housing, then leave the green wire disconnected. Grounding the motor at both the green wire and at the motor case causes a ground loop that has been shown to disrupt the feedback signals. Choose one or the other.

Load Coupling

A non-rigid coupling must be used between the motor shaft and the load to minimize mechanical stress due to radial loads, axial loads or misalignment. If you feel that the radial load on the motor is excessive, you may want to consider connecting the motor to an idler shaft that is supported by pillow block bearings (or similar). Then the load can be coupled to the idler shaft without risking damage to the motor bearings.

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Configuration

12A8 Capabilities

Mode Category	Mode Name
Torque	Current
Velocity Estimation	Voltage*

***** Voltage Mode does not use direct feedback to close the velocity loop; therefore, it can't be considered a true velocity mode. This mode produces velocity that is roughly proportional to the input command but is not as precise as using a Tachometer or Encoder.

The correct mode is determined by the requirements of the controller. Some controllers require that the drive be in torque mode. Other controllers require that the drive be in velocity mode. Check the documentation on your controller or contact the manufacturer of your controller to determine the correct mode for your drive.

Advanced Motion Controls Analog Servo Drives are configured using Switches and Potentiometers. There is no software to download or configure.

The basic setup of these servo drives is straight forward and user friendly. These instructions will walk you through the steps necessary to configure your drive to your system:

- Configure the drive mode.
  - Torque Mode (page 13)
  - Velocity Mode (page 14)
    - Voltage

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Torque Mode Configuration

The terms 'Torque Mode' and 'Current Mode' are synonymous. They can be interchanged and you may see either of these terms throughout this document and other motion control documents.

The Switches and Potentiometers set the mode on the drive. Use the Mode Selection Table for the correct configuration.

Mode Selection Table – Torque Mode

Switches	**SW1**	Off
	SW2	Off
	SW3	On
	SW4	Off
Pots	**Pot1** Loop Gain	Full CCW
	Pot2 Current Limit	8.4 turns*
	Pot3 Reference Gain	Full CW
	Pot4 Offset	Set for no torque

Current Limit with these settings – 3.7A continuous, 7.4A peak

* *Potentiometer Instructions* – CW is the clockwise direction, CCW is the counterclockwise direction. Full CW or Full CCW means the pot has been turned to the end of its travel where it begins to click on every turn. These potentiometers have a 14 turn range before they start to click.

The number of potentiometer turns on the Mode Selection Table is referenced from the full counterclockwise position. To maintain consistency in the number of turns the initial starting point is defined as follows:

1. Turn the pot CCW until the pot begins to click on every turn.
2. Continue to slowly turn the pot CCW until the next click is heard, then stop.
3. Now turn the pot in the CW direction the number of turns indicated in the Mode Selection Table.

Gain Setting

The gain of the drive (amps out)/(volts in) can be adjusted using the Reference Gain Potentiometer, Pot 3. Turning the pot to the full clockwise position results in a gain of roughly .75 A/V. Turning the pot counter clockwise reduces the gain down to a minimum of zero.

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Velocity Mode Configuration

Velocity mode controls the motor such that the motor velocity is proportional to the input command. The gain can be expressed as (output velocity)/(input command). Common units are (rpm)/(V) and (counts per second)/(V).

Since velocity mode in this system doesn't use direct feedback, performance isn't as accurate as a true velocity mode.

Voltage Mode
This mode does not use any feedback to determine velocity. Velocity is estimated by measuring the voltage across the motor terminals. Since motor voltage is proportional to the speed, the velocity can be controlled.

The Switches and Potentiometers set the mode on the drive. Use the Mode Selection Table for the correct configuration.

Mode Selection Table – Voltage Mode

Switches	**SW1**	On
	SW2	Off
	SW3	Off
	SW4	Off
Pots	**Pot1** Loop Gain	11 turns
	Pot2 Current Limit	8.4 turns*
	Pot3 Reference Gain	Full CW
	Pot4 Offset	Set for no torque

Current Limit with these settings – 3.7A continuous, 7.4A peak

** Potentiometer Instructions* – CW is the clockwise direction, CCW is the counterclockwise direction. Full CW or Full CCW means the pot has been turned to the end of its travel where it begins to click on every turn. These potentiometers have a 14 turn range before they start to click.

The number of potentiometer turns on the Mode Selection Table is referenced from the full counterclockwise position. To maintain consistency in the number of turns the initial starting point is defined as follows:

1. Turn the pot CCW until the pot begins to click on every turn.
2. Continue to slowly turn the pot CCW until the next click is heard, then stop.
3. Now turn the pot in the CW direction the number of turns indicated in the Mode Selection Table.

Continued…

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Loop Gain

Pot 1

In Velocity Mode the loop gain increases the responsiveness of the system. The loop gain settings in the mode selection table are a good starting point. However, once the drive is in the system, the loop gain will need to be adjusted to match the system dynamics.

To adjust the Loop Gain

- Turn the Loop Gain pot to the full counterclockwise position.
- Enable the drive
- Turn the Loop Gain pot clockwise.
- When the system begins to make a loud buzzing noise, turn the pot in the counterclockwise direction until the buzzing stops.
- Turn the pot one more turn in the counter clockwise position.

Reference Gain

Pot 3

The gain of the drive (velocity out)/(volts in) can be adjusted using the Reference Gain Potentiometer, Pot 3. Turning the pot clockwise increases the gain, while turning the pot counter clockwise decreases the gain.

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4
Going into Production

Prototype to Production

Once you have completed your proof of concept you will be ready to design for production. If you decide that the QuickStart drive and motor are perfect for you then you're in luck. Both are popular off-the-shelf items that are readily available. Drives can be ordered directly from us and we can put you in touch with the appropriate motor supplier.

If your servo system requires a drive that better fits your application such as:

- Additional features
- Different power range
- Smaller size
- Different form factor such as 'plug in' style drives
- Network connectivity

Then our applications engineers can help optimize your system by selecting the best drive for your needs.

You will also be in contact with a local representative to help you with the selection of motors and other system components such as cables, gear boxes, slides, bearings and more.

Feedback

Your feedback is important to us. Your comments can make QuickStart better and help us improve our processes, technical support, customer support and product offering. Please go to www.a-m-c.com/feedback.html

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Appendix

A. System Specifications

B. Drive

C. Motor

D. Cables

E. System Interface Board

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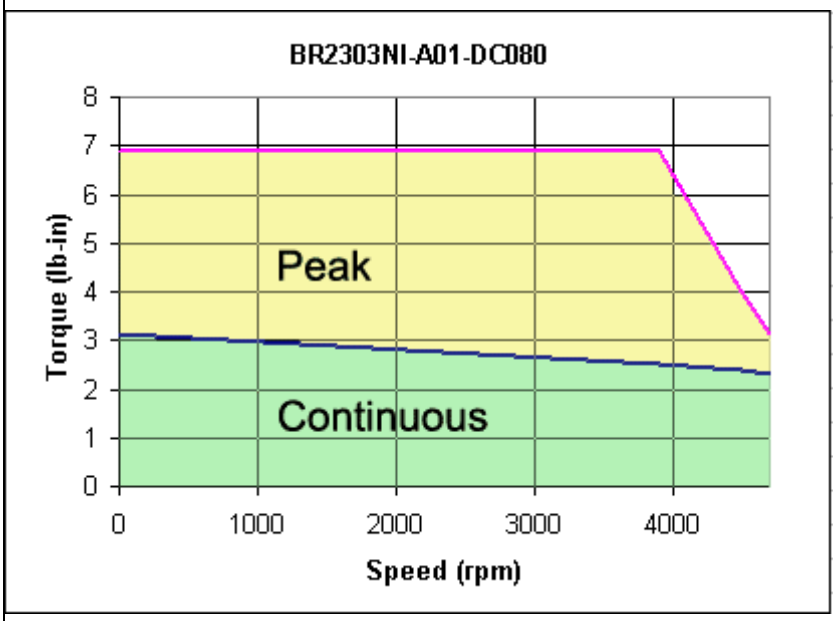
System Specifications

System Specifications

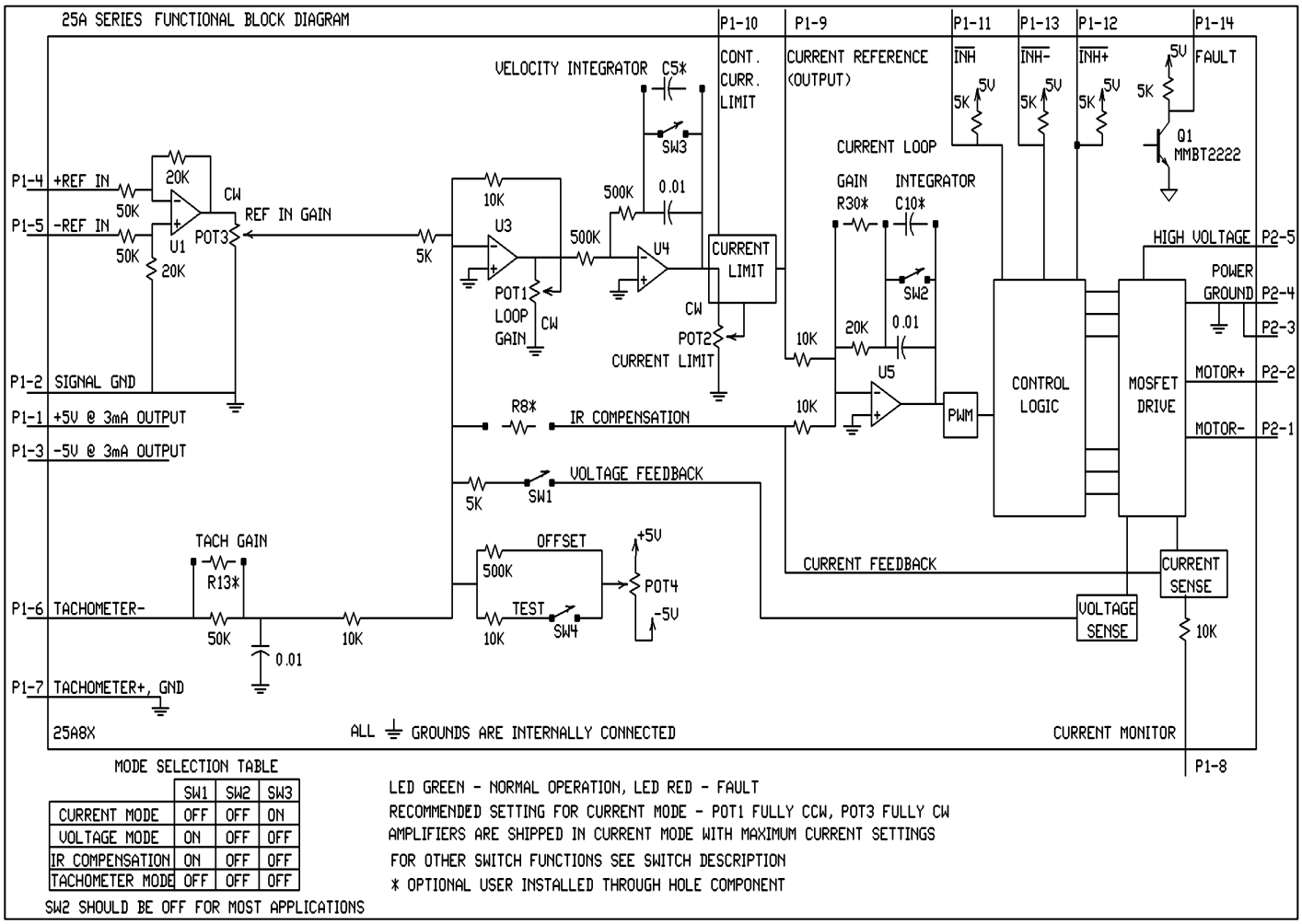
Torque – peak	6.88 lb-in, 0.777
Torque – continuous	3.13 lb-in, 0.35 Nm
Velocity Maximum	4700
Supply Voltage	20-80VDC
Encoder Resolution	NA – this package does not come with an encoder
Speed Torque Curve	

SERIES 25A SERVO AMPLIFIERS
Models: 12A8, 25A8, 20A14, 20A20
Miniature Series

FEATURES:

- Surface-mount technology
- Small size, low cost, ease of use
- DIP switch selectable: current, voltage, velocity, analog position loop
- Four quadrant regenerative operation
- Agency Approvals:

BLOCK DIAGRAM:



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DESCRIPTION: The 25A Series PWM servo amplifiers are designed to drive brush type DC motors at a high switching frequency. A single red/green LED indicates operating status. All models are fully protected against over-voltage, over-current, over-heating and short-circuits across motor, ground and power leads. All models interface with digital controllers or can be used as a stand-alone drive. They require only a single unregulated DC power supply. Loop gain, current limit, input gain and offset can be adjusted using 14-turn potentiometers. The offset adjusting potentiometer can also be used as an on-board input signal for testing purposes when SW4 (DIP switch) is ON.

SPECIFICATIONS:

	MODELS			
POWER STAGE SPECIFICATIONS	**12A8**	**25A8**	**20A14**	**20A20**
DC SUPPLY VOLTAGE	20 - 80 V	20 - 80 V	40 - 140 V	40 - 190 V
PEAK CURRENT (2 sec. Max., internally limited)	± 12 A	± 25 A	± 20 A	± 20 A
MAXIMUM CONTINUOUS CURRENT (internally limited)	± 6 A	± 12.5 A	± 10 A	± 10 A
MINIMUM LOAD INDUCTANCE*	200 µH	200 µH	250 µH	250 µH
SWITCHING FREQUENCY	36 kHz	22 kHz ± 15%		
HEATSINK (BASE) TEMPERATURE RANGE	0 ^{o} to + 65^{o}C, disables if > 65^{o}C			
POWER DISSIPATION AT CONTINUOUS CURRENT	24 W	50 W	70 W	100 W
OVER-VOLTAGE SHUT-DOWN (self-reset)	86 V	86 V	142 V	195 V
BANDWIDTH (load dependent)	2.5 kHz			

MECHANICAL SPECIFICATIONS	
POWER CONNECTOR	Screw terminals
SIGNAL CONNECTOR	Molex connector
SIZE	5.09 x 2.98 x 0.99 inches 129.3 x 75.8 x 25.1 mm
WEIGHT	10 oz. 0.28 kg

* Low inductance motors ("pancake" and "basket-wound") require external inductors.

PIN FUNCTIONS:

CONNECTOR	PIN	NAME	DESCRIPTION / NOTES	I/O
P1	1	+5V OUT	Internal DC-to-DC converter, outputs regulated voltages of ±5 V @ 3 mA for customer use. Short circuit protected.	O
	2	SIGNAL GND		GND
	3	-5V OUT		O
	4	+REF IN	Differential analog input, maximum ±15 V, 50K input resistance.	I
	5	-REF IN		
	6	-TACH IN	Maximum ± 60 VDC, 60K input resistance.	I
	7	+TACH (GND)		
	8	CURRENT MONITOR OUT	This signal is proportional to the actual current in the motor leads. Scaling is 2A/V for 12A8 and 4 A/V for 25A8, 20A14 and 20A20.	O
	9	CURRENT REFERENCE OUT	Command signal to the internal current-loop. The maximum peak current rating of the amplifier always equals 7.25V at this pin. See current limit adjustment information below.	O
	10	CONTINUOUS CURRENT LIMIT	Can be used to reduce the factory-preset maximum continuous current limit.	I
	11	INHIBIT	This TTL level input signal turns off all four power devices of the "H" bridge drive when pulled to ground. This inhibit will cause a FAULT condition and a red LED. For inverted inhibit inputs; see section "G".	I
	12	+INHIBIT	Disables the amplifier for the "+" direction only. This inhibit will not cause a FAULT condition or a red LED.	I
	13	-INHIBIT	Disables the amplifier for the "-" direction only. This inhibit will not cause a FAULT condition or a red LED.	I
	14	FAULT OUT (red LED)	TTL compatible output. It becomes high during output short-circuit, over-voltage, over-heating, inhibit, and during "power-on reset". Fault condition indicated by a red LED.	O
	15	NC	Not connected	
	16			
P2	1	-MOTOR	Motor minus connection.	O
	2	+MOTOR	Motor plus connection.	O
	3	POWER GROUND	Power Ground.	GND
	4	POWER GROUND	Power Ground.	GND
	5	HIGH VOLTAGE	DC voltage input.	I

SWITCH FUNCTIONS:

SWITCH	FUNCTION DESCRIPTION	SETTING	
		ON	OFF
1	Internal voltage feedback	On	Off
2	It is recommended to leave SW2 in OFF position.	Shorts out the current loop integrator capacitor.	Current loop integrator operating
3	This capacitor normally ensures "error-free" operation by reducing the error-signal (output of summing amplifier) to zero.	Shorts out the outer velocity/voltage loop integrator capacitor	Velocity/Voltage integrator operating
4	Offset / test. Controls sensitivity of the "offset" pot. Used as an on-board reference signal in test mode.	Test	Offset

POTENTIOMETER FUNCTIONS:

POTENTIOMETER	DESCRIPTION	TURNING CW
Pot 1	Loop gain adjustment in voltage & velocity modes. Turn this pot fully ccw in current mode.	Increases loop gain
Pot 2	Current limit. It adjusts both continuous and peak current limit by maintaining their ratio (50 %).	Increases current limit
Pot 3	Reference gain. It adjusts the ratio between input signal and output variables (voltage, current, or velocity).	Increases reference input gain
Pot 4	Offset / test. Used to adjust any imbalance in the input signal or in the amplifier. When SW4 (DIP switch) is ON, the sensitivity of this pot is greatly increased thus it can be used as an on-board signal source for testing purposes. See section "G".	N/A

TEST POINTS FOR POTENTIOMETERS: See section “G”

SET-UP: See section “G” for engineering and installation notes.

OPERATING MODE SELECTION:

These modes can be selected by the DIP-switches according to the chart in the functional block diagram:

- Current Mode
- Voltage Mode
- IR Compensation Mode*****
- Tachometer Mode

APPLICATION NOTES:

*****For IR compensation mode, a resistor must be added to location R8*. See the functional block diagram above and section “G” for more information. The combination of the resistor addition and the switches set for voltage mode will configure the amplifier for IR compensation mode. See section "G" for more information.

See section G for more information on analog position loop mode.

CURRENT LIMIT ADJUSTMENTS:

These amplifiers feature separate peak and continuous current limit adjustments.

The current limit adjusting Pot 2 adjusts both peak and continuous current limit at the same time. It has 12 active turns plus 1 inactive turn at each end and is approximately linear. Thus, to adjust the current limit, turn the potentiometer fully counter-clockwise, then turn clockwise to the appropriate value. If the desired limit is, for example, 10 amperes, and the servo amplifier peak current is 20 amperes, turn the potentiometer 7 turns clockwise from the fully counter-clockwise position.

Pin P1-9 is the input to the internal current amplifier stage. Since the output current is proportional to P1-9, the adjusted current limit can easily be observed at this pin. Note that a command signal must be applied to the reference inputs to obtain a reading on P1-9. The maximum peak current value equals 7.25 V at this pin and the maximum continuous current value equals 3.63 V at this pin.

The actual current can be monitored at pin P1-8.

The continuous current can be reduced without affecting the peak current limit by connecting an external current limiting resistor R-lmt between P1-10 and P1-2. See table below.

Current Limit Resistor (Ω)	15K	6.6K	3.4K	2.1K	1.2K	810	500	250	0
Continuous Current Limit %	90 %	80 %	70 %	60 %	50 %	40%	30 %	20 %	10 %

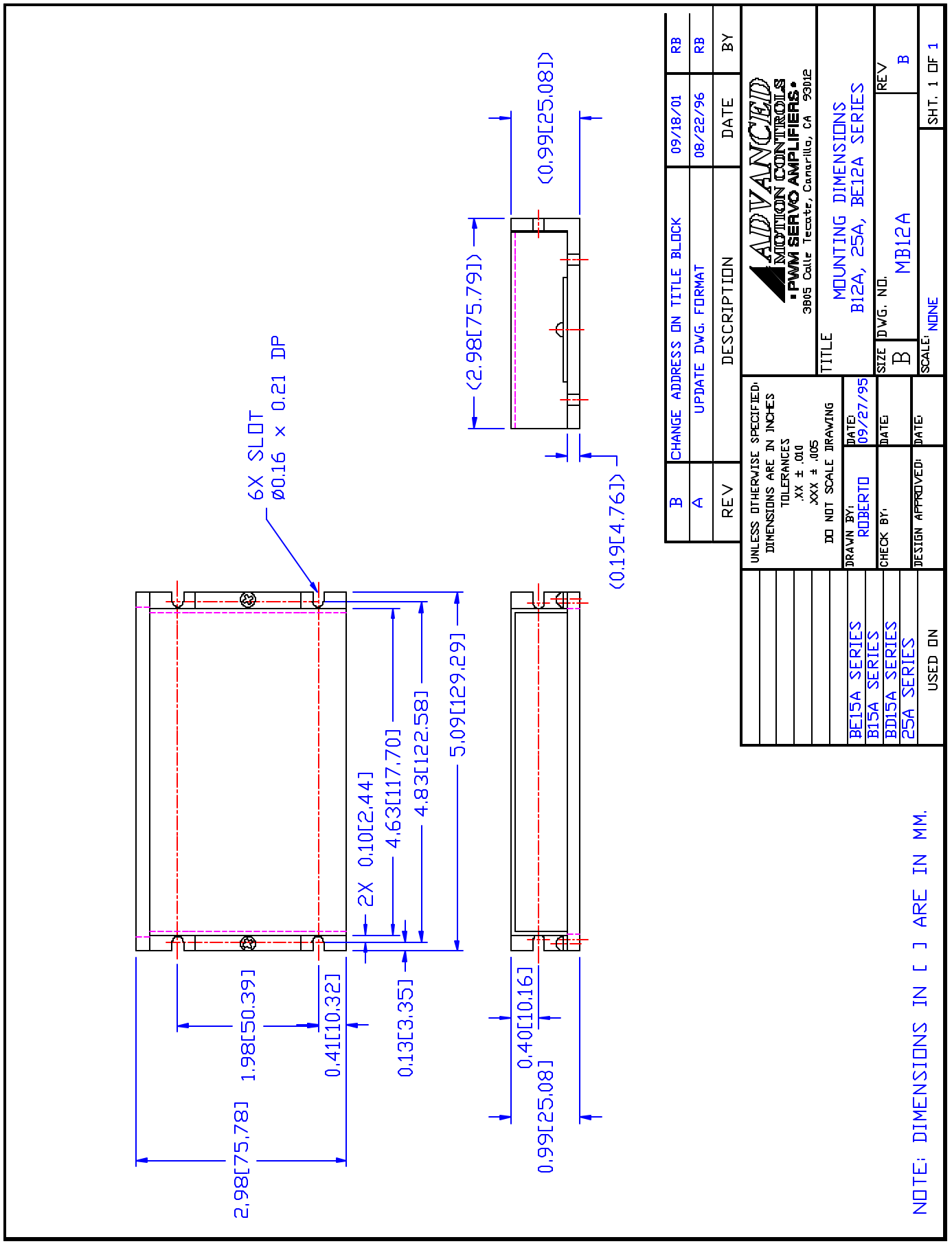
TYPICAL SYSTEM WIRING: See section "G".

ORDERING INFORMATION:

Models: 12A8X, 25A8X, 20A14X, and 20A20X

X indicates the current revision letter.

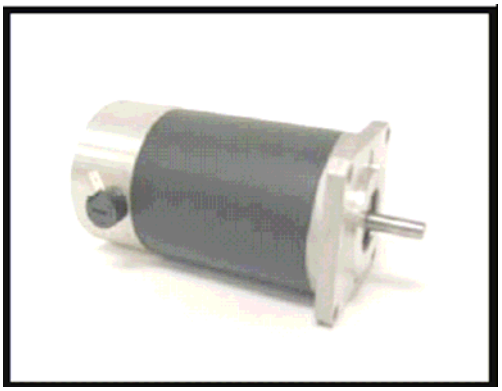
MOUNTING DIMENSIONS: See page F-7.


6X SLOT
Ø0.16 x 0.21 DP
2X 0.10[2.44]
4.63[117.70]
4.83[122.58]
5.09[129.29]
0.13[3.35]
0.41[10.32]
1.98[50.39]
2.98[75.78]
0.40[10.16]
0.99[25.08]
(2.98[75.79])
(0.99[25.08])
(0.19[4.76])
B CHANGE ADDRESS ON TITLE BLOCK 09/18/01 RB
A UPDATE DWG. FORMAT 08/22/96 RB
REV DESCRIPTION DATE BY
ADVANCED MOTION CONTROLS
•PWM SERVO AMPLIFIERS•
3805 Calle Tecate, Camarillo, CA 93012
TITLE MOUNTING DIMENSIONS B12A, 25A, BE12A SERIES
SIZE B DWG. NO. MB12A REV B
SCALE: NONE SHT. 1 OF 1
UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES
.XX ± .010
.XXX ± .005
DO NOT SCALE DRAWING
DRAWN BY: ROBERTO DATE: 09/27/95
CHECK BY: DATE:
DESIGN APPROVED: DATE:
BE15A SERIES
B15A SERIES
BD15A SERIES
25A SERIES
USED ON
NOTE: DIMENSIONS IN [ ] ARE IN MM.

MBR2303NI BRUSHLESS SERVO MOTOR

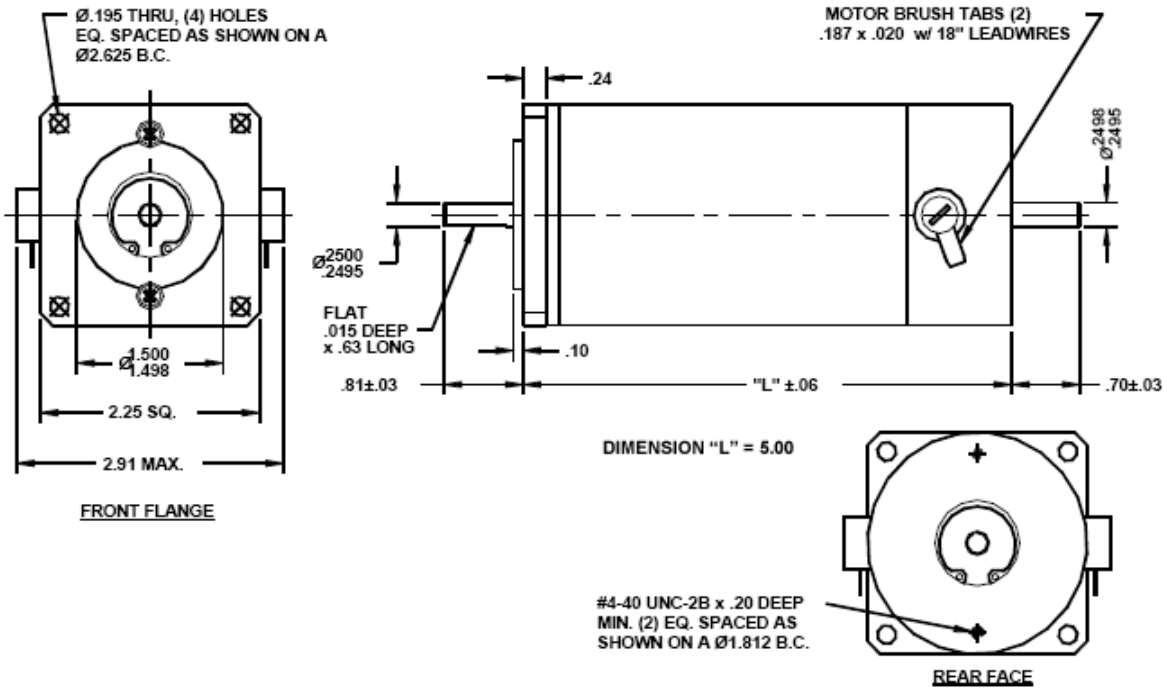
FEATURES:

- 2.25 Inch Size 23 Motor
- Continuous Torques up to 50 oz-in
- Speeds up to 4700 rpm
- Voltage Rating up to 60 Vdc
- 10 Lb Radial Load 1/2" from Front Face



SPECIFICATIONS:

SPECIFICATIONS	UNITS	VALUE
CONTINUOUS TORQUE	Nm (oz-in)	0.35 (50)
PEAK TORQUE	Nm (oz-in)	2.47 (350)
SPEED @ RATED VOLTAGE	RPM	4700
RATED VOLTAGE	V dc	60
CONTINUOUS CURRENT	A	3.7
PEAK CURRENT	A	26.1
TORQUE CONSTANT	Nm / A (oz-in / A)	0.1050 (14.87)
VOLTAGE CONSTANT	V / KRPM	11
RESISTANCE	ohms	2.0
INDUCTNACE	mH	5.20
INERTIA	kg-cm² (oz-in-s²)	0.438 (0.0062)
WEIGHT	Kg (lb)	1.41 (3.1)



ADVANCED MOTION CONTROLS
3805 Calle Tecate, Camarillo, CA 93012 Tel: (805) 389-1935, Fax: (805) 389-1165

CBL-D01 DRIVE CABLE

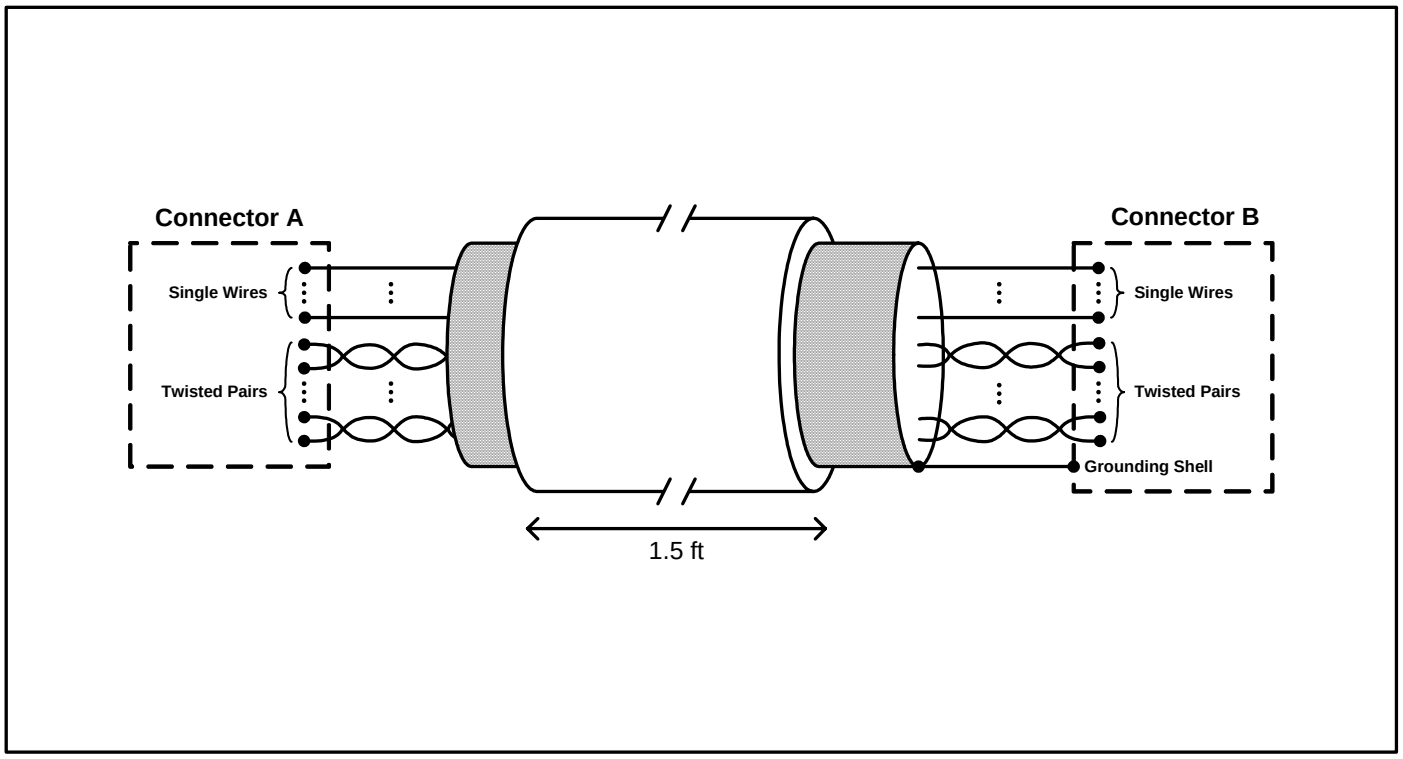
WIRING SPECIFICATIONS:

CABLE: CBL-D01						
Side 1		**Common**			**Side 2**	
Connector	**Contact**	**Wiring Scheme**	**Function**	**Wire Color**	**Contact**	**Connector**
A **16-Pin Molex** Connector: P/N 22-01-3167 Terminals: P/N 08-50-0114	2	Single Wire	SGND	black	2	**B** **26-Pin AMP (D-SUB)** Plug: P/N 748365-1 Housing: P/N 748677-2 Terminals: P/N 748333-4
	6	Single Wire	-TACH IN	black/white	6	
	7	Single Wire	+TACH	red	7	
	8	Single Wire	Current Monitor	red/black	8	
	9	Single Wire	(Variable)	blue	9	
	10	Single Wire*	(Variable)	blue/white	10	
	11	Single Wire*	(Variable)	purple	11	
	12	Single Wire	(Variable)	purple/white	12	
	13	Single Wire	(Variable)	orange	13	
	14	Single Wire	(Variable)	orange/white	14	
	15	Single Wire	(Variable)	brown	15	
	16	Single Wire	(Variable)	brown/white	16	
	1	Twisted Pair	+REF OUT	yellow	1	
	3		-REF OUT	yellow/black	3	
	4	Twisted Pair	+REF IN	green	4	
	5		-REF IN	green/white	5	
	-	Shield	Shield	-	Shell	

NOTE: For cables with only twisted pairs, single wires can be paired with other single or unused wires.

* Creating a twisted pair from these two wires is recommended for brushless applications.

DIAGRAM:



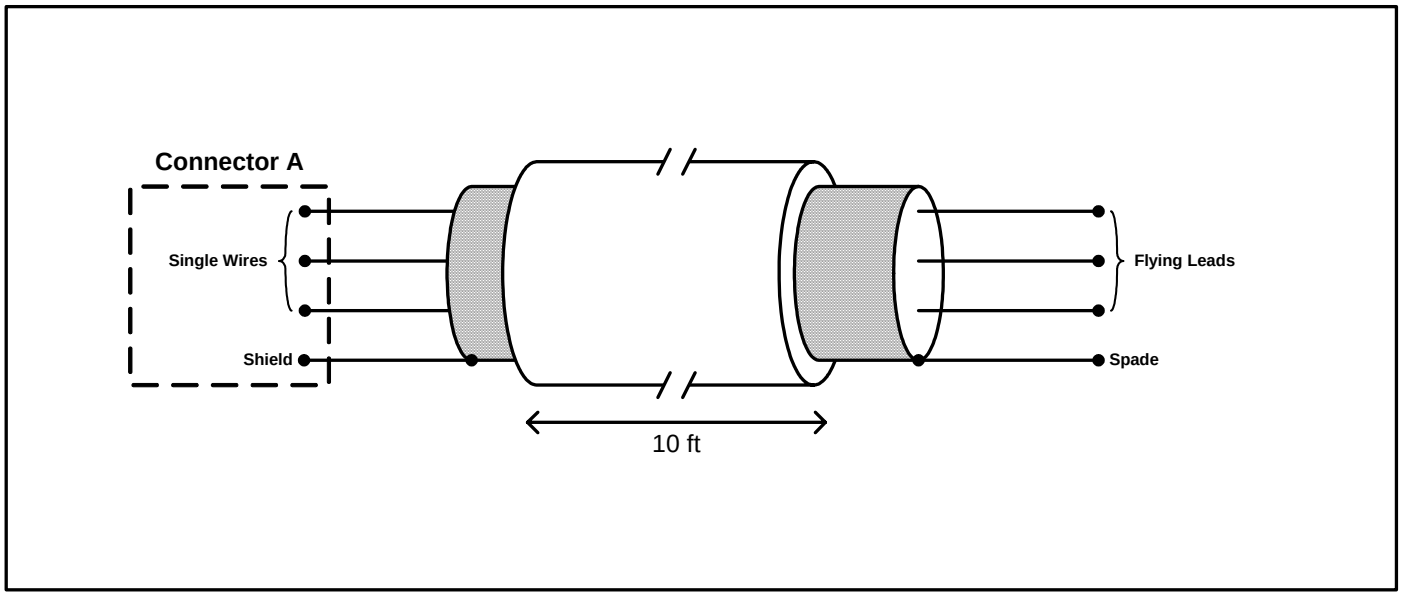
ADVANCED **MOTION CONTROLS**
3805 Calle Tecate, Camarillo, CA 93012 Tel: (805) 389-1935, Fax: (805) 389-1165

CBL-P01-10 POWER CABLE

WIRING SPECIFICATIONS:

CABLE: CBL-P01-10						
Side 1		Common			Side 2	
Connector	Contact	Wiring Scheme	Function	Wire Color	Contact	Connector
A (4-Pin Molex) Connector, Terminals: P/N 39-01-3043, P/N 39-00-0081	1	Single Wire	Motor A	red	Crimp	-
	2	Single Wire	Motor B	white	Crimp	
	3	Single Wire	Motor C	black	Crimp	
	4	Shield	Shield	grey	Spade	

DIAGRAM:



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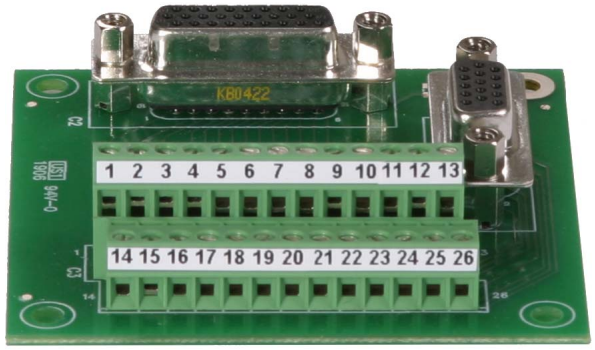
System Interface Board (SIB)



Dimensions	72mm x 72mm
C1 Connector	15 pin to motor
C2 Connector	26 pin to drive
C3 Connector	26 pin user interface.

C3 Pin Functions

Pin	Function
1	+5V 3mA
2	SGND
3	-5V 3mA
4	+Ref In
5	-Ref In
6	-Tach In
7	+Tach/Gnd
8	Curr Mon Out
9	Curr Ref Out
10	Cont Curr Lim
11	Inhibit
12	+Inhibit
13	-Inhibit
14	Fault Out
15	NC
16	NC
17	
18	
19	SGND (Encoder)
20	5V (Encoder)
21	Encoder Channel A+
22	Encoder Channel A-
23	Encoder Channel B+
24	Encoder Channel B-
25	Encoder Channel I+
26	Encoder Channel I-